of the muscle body. This tendon, of the usual glistening white appearance, lies towards the inner margin of the combined muscle, and inserts in the knee. Attached to the lower end of the graciles is also a sheet of thin transparent connective tissue which passes downwards, covering the tendon of the semitendinosus as well as the proximal ends of the tibial muscles. (A histological preparation shows this to be areolar tissue.)

The tendon of the semitendinosus passes beneath, i.e., dorsal to the broad lower end of the gracilis mass, and inserts low down on the tibia. Throughout its course it is covered with the thin sheet of tissue mentioned above, but it does not perforate the ligamentous head of the graciles. In this respect *P. corroboree* differs from the other *Pseudophryne* species mentioned above, all of which are placed in Group III. *P. corroboree* has the typical ranid arrangement of the tendons, and must accordingly go into Group IV.

Other Observations on Living Specimens.

As previously noted, four *P. corroboree* have been successfully kept in the laboratory since January, 1954. They are housed in a ventilated, glass-topped wooden box measuring about 10″ × 8″. In the bottom of the box is a shallow copper tray, and the box is kept packed with damp moss to within an inch of the lid. The purpose of this is to concentrate the populations of the vinegar fly *Drosophila* which are used as food, and to bring them therefore within easy reach of the frogs. The latter have always fed very readily, and indeed seem to spend most of their time on top of the moss, even during the winter, looking for flies. The locomotion is definitely *Pseudophryne*-like, being in the nature of a rapid crawl. During the process the body is held on tiptoe. However, if they are suddenly disturbed, the frogs will make hops of four to six inches. Although normally cryptozoic, they swim quite readily when put into water. In general activity they resemble *P. australis* and *P. bibroni*, although unlike the latter species they do not "sham dead" when touched.

What they normally feed on can only be guessed at, but the author was most impressed by the eagerness with which they took both *Drosophila* and ordinary house-flies, right from the beginning. They will also feed readily on small black ants. Prof. C. W. Emmens, to whom I am indebted for this piece of information, tells me that his corroboree frogs, received from Dr. Chaffer, have thrived on a diet consisting solely of these small black ants.

When living food is introduced into the vivarium, the behaviour of the frogs is very striking. The males are much more alert and active than the females, and will often stalk flies before catching them. Although only small frogs (av. length *ca.* 25 mm.), they can accurately strike flies at distances from one-half to five-eighths of an inch. The "slapping" sound as the tongue returns to the mouth with its prey can be heard three feet away. When stalking a fly, the frog rises on tiptoes, and notable tremors pass along the rigidly held body right to the tips of the digits. As soon as food is introduced, and the males become aware of it, they begin to call loudly. This brings the remaining frogs out of their hiding places, and the flies are quickly snapped up.

Prof. Emmens also informs me that for a time he kept a mixed population of *P. corroboree* and *P. australis* in one vivarium. Males of *P. australis* would indiscriminately clasp with their own species or with male or female corroborees. The male corroboree frogs on the other hand only clasped with females of their species.

Breeding.

Attempts to stimulate ovulation by pituitary injection were not successful. The method used was that of Hamburger (1948), both males and female being injected with *Bufo* pituitary. On the final attempt, there appeared to be some reaction. The males became very active and called repeatedly, and the female dug a number of separate burrows in the moss. However, neither oviposition nor clasping occurred and the attempts were temporarily abandoned. The author was unwilling to use the more drastic method which involves sacrificing the animals in order to effect artificial insemination.

Dr. Chaffer has provided some valuable information on the breeding habits in the wild state.

The frogs were actively breeding during the second half of December and the early part of January. No information is available as to when this activity actually commenced.

The general pattern of breeding behaviour would appear to resemble that of the related *P. australis* and *P. bibroni*, in that the eggs are laid in burrows. If a subsequent shower of rain fails to materialize within a short time, the eggs proceed with their development up to a certain point and then just "wait" until they are washed into water. The latest intra-ovular stage secured by the author was an 18 mm. tadpole with spiracle and well-developed hindlimb buds.

The female *P. corroboree* makes her burrow in decaying vegetation under the sphagnum moss. These burrows may be up to ten inches beneath the surface. In the second half of December, 1954, opened burrows contained eggs as well as both parents. By the end of the first week in January, 1955, it was usual to find only one parent in the burrow with the eggs. The number laid is typically twelve. This is to be compared with the twenty-odd deposited by *P. australis*, and the ninety to a hundred eggs laid by the female of *P. bibroni*. It should be noted that adults of all three species are of the same order of size.

Harrison (1922) states that *P. australis* undergoes metamorphosis four weeks after hatching, whereas the larvae of *P. bibroni* require 5–6 months. He correlates the abbreviated development of *P. australis* with the fact that this frog lays its eggs by temporary watercourses which may dry up in a short time. *P. bibroni* on the other hand "lays its eggs about the margins of sluggish streams and stagnant ponds . . . has no need of undue haste" (Harrison, 1922). He also (*loc. cit.*) mentions that as long as *P. bibroni* eggs remain moist, they can last for four months out of water, in a state of suspended development.

The meagre amount of available information respecting the life history of *P. corroboree* suggests that it may follow the pattern of *P. australis*. The female lays a very small number of unusually large yolky eggs which are capable of going through to metamorphosis in a short time. If corroboree eggs fail to reach water shortly after being laid, there is some evidence (see below) that they, too, may reach an advanced stage of development and then "wait" for an indefinite period (that could well be several months) until the next rainfall.

A problem of considerable interest here is how eggs in a burrow ten inches beneath the surface of the moss could be washed out by a subsequent shower of rain. It seems likely that with enough rain the area containing burrows is inundated by a rise in level of water in the surrounding bog.

In Table 2 comparative egg-measurements are given for *P. australis*, *P. bibroni*, and *P. corroboree*. Regrettably, these measurements, through lack of sufficient material, are not all on similar stages.

Apart from the initial great swelling of the jelly, once the egg gets into water, the diameter of the vitelline membrane increases steadily as the contained tadpole grows. However, the stage of development is indicated wherever possible.

It will be noted that the newly spawned, unfertilized egg of *P. corroboree* was received by the author already preserved in 10% formalin. On this account the figure for the overall diameter is probably not that of the egg as it is laid. On the other hand, the measurement of the egg proper (3·5 mm.) would indicate that it is larger than the eggs of both *P. australis* and *P. bibroni* at a comparable stage. It will also be noted that in *P. bibroni* the jelly swells up to twice its original diameter after being put into water. All of the twelve *corroboree* eggs brought back from Mt. Kosciusko in Jan., 1955, by Dr. Chaffer were in an advanced stage of development when the author received them in Feb., 1955. They had been kept in a minimal quantity of water—little more than a film—for a month, and at the time of receipt were badly infected with *Saprolegnia*. The larvae were immediately freed from their membranes and set up in a small aquarium.

Prof. Emmens has informed the author that eggs of similar age hatched in a very short time when put into a suitable quantity of water.

Two tadpoles were fixed immediately after release from the membranes and measured respectively 11·6 mm. and 12·3 mm. This order of size is the earliest known at which hatching can occur. Only future work will show whether the tadpoles can come out at an even earlier stage. In the two tadpoles in question, the branchial chamber was obviously well developed on each side, but the spiracular passage was still in the form of an open horseshoe with very prominent raised edges, on the left side of the body. Further reference to this rather remarkable structure will be made below.

Of the remaining tadpoles, only two were salvaged in a sound condition for preserving. One of these had died six days after being freed from its membranes, and the other after twenty-two days.

TABLE 2.

Species.	Overall Diameter. (Millimetres.)	Diameter of Vitelline Membrane. (Millimetres.)	Remarks.
Pseudophryne australis	7·8	2·6	Harrison, 1922. Measurement made in water? "Ovum segmenting."
,, ,,	*ca.* 8·0–9·0	3·0	Present author. Much debris attached to jelly. Stage of closed neural folds.
,, ,,	9·1	6·8	Present author. Prehatching (?) stage.
P. bibroni	4·0	2·0	Harrison, 1922. Not yet in water? Stage?
,, ...	3·2–4·0	2·5–2·7	Present author. Newly spawned, not yet in water.
,, ...	7·8–8·5	3·3–3·6	,, ,, Morula stage, 15 hours later than foregoing. In water.
P. corroboree	6·0	3·5	Present author. Newly spawned but unfertilized. Specimen in 10% formalin, as received.
,, ...	7·1–8·3	5·1–6·0	Present author. Pre-hatching? Open spiracular channel. In water.

The length of the "6-day tadpole" was 16·3 mm., and that of the "22-day tadpole" was 18 mm., or slightly less than ¾″. The other tadpoles, all of which died, were too badly mauled by their fellows to be of any use as material. The heavy mortality was probably due to unaccustomed high temperatures. The author is informed that even during the summer months, in their natural habitat, the water temperature seldom exceeds 10° C.

The six viable eggs collected by Dr. Chaffer at Mt. Kosciusko at Easter, 1955, all contained tadpoles ready to hatch—indeed their general appearance (on 20/4/55) suggested that they had been laid a long time previously, possibly even as far back as Dec., 1954. As soon as these eggs were put into water, and only the outer layers of jelly pricked, the tadpoles literally "fell" out of the enclosing membranes. The diameter of the egg proper at this stage was of the order of 5 mm. All of the yolk had been used up, and the spiracle was definitely established as a small opening on the left side of the body about halfway between the snout and the base of the tail.

Although of the same order of length as the "22-day tadpole" referred to above, viz., 18 mm., there had been a considerable change in body proportions especially in the body-tail ratio. In the 12 mm. tadpole the tail is approximately 1·5 times the length of the main body, whereas in the 18 mm. (Easter, 1955) tadpoles it is twice as long as the body. It looked even more than this due to the slimming-down of the body through yolk absorption.

These are very dark tadpoles. To the naked eye they appear almost black, but under the microscope narcotized specimens show a profusion of silvery chromatophores. These disappear after a short time in alcohol.

Owing to present restriction of material, only the main points of what appears to be a decidedly interesting method of spiracle formation will be touched upon.

In the earliest stages in the author's possession—tadpoles of 11·6 mm. and 12·3 mm. respectively (approximate age at least 39 days)—the right branchial chamber is completely closed in by the opercular fold. The left branchial chamber on the other hand communicates with the outside through a very well developed postero-lateral slit in the constriction between the head and the body. In one of the tadpoles, gill filaments are clearly seen, projecting through this slit. The latter is surrounded by a horseshoe-shaped depression on the skin. This depression, which has prominent raised edges, lies obliquely across the body with its "open" end directed anteriorly and ventrally. This "open" end almost reaches the midventral line.

Transverse sections of the 11·6 mm. larva show that a short connecting passage already exists, passing from the right branchial chamber, beneath the epidermis across the midline to open within the depressed area already mentioned. No trace of this opening was obvious in the whole specimen. At this stage, then, the only communication the right branchial chamber has with the outside is via this short narrow transverse passage. The left branchial chamber, on the other hand, communicates directly with the outside by the prominent slit already referred to.

In a 16·3 mm. tadpole, six days older than the foregoing, the horseshoe-shaped depression in the epidermis has increased enormously in extent. It is now broadly oval with particularly prominent raised edges, and appears to be "tunnelling" across towards the right branchial chamber. Within the area, the epidermis covering the yolk mass is particularly thin and the yolk shows clearly through. The slit-like opening to the pharynx on the left side is very prominent, and is partly occupied by gill filaments.

In an 18 mm. tadpole (the "22-day tadpole" referred to earlier) (approx. real age 61 days) the process of tunnelling has gone so far as to establish communication with the right branchial chamber. This is quite definite. The lower margin ("open end") of the depression has reached the midventral line. At this point it dips under as a wide circular passage leading into the right branchial chamber. It is possible to see right along this passage into the latter. Thus the right branchial chamber communicates with the outside by means of this wide passage. What has happened to the narrower one referred to above, which existed earlier, and which extended further across to the left side, is not known. Perhaps it is incorporated in this second, larger passage. This point will be cleared up when further material comes to hand. At the moment the author is unwilling to section his very scarce material.

The ultimate fate of the depressed horseshoe-shaped area must also await further research, as material is not available covering later stages.

The raised margins of the area are so prominent that the outline of the tadpole, as seen from above, is notably asymmetrical. A clue to the possible fate of the area is given by an abnormal tadpole of *P. bibroni*, described below.

It was possible to study branchial chamber formation in tadpoles of the two related species *P. australis* and *P. bibroni*. In both of these, the course of events was different from that observed in *P. corroboree*, and follows a more "typical" anuran path. In neither *australis* nor *bibroni* was there any suggestion of the depressed horseshoe-shaped area seen in *corroboree*.

At this point the author must put on record a very curious yet relevant fact. One embryo of *P. bibroni*, when at the "early tail bud" stage, developed a marked edema in the yolk region which became swollen to twice its original size. This embryo was freed from its membranes and kept under routine observation for a number of days. To the author's surprise, it acquired on its left side a *corroboree*-like depressed area which subsequently "tunnelled" across towards the right side of the body and the right branchial chamber. To avert the possibility of this obviously feeble larva dying and disintegrating before it could be adequately preserved, it was eventually killed and fixed. By that time, the margins of the depression had grown over and inwards towards one another, and were clearly about to fuse to form a spiracular passage along the left side of the body.

Apparently the edema was enough to upset the normal processes of development and cause the *bibroni* larva to adopt this atypical mode.

It is quite likely that in *P. corroboree* the development of the spiracular passage follows a similar course. Unfortunately the next stages in the author's possession (collected at Easter, 1955) had the spiracular passage, and the spiracle, fully developed. It is hoped that intermediate stages will be forthcoming on an expedition to the Kosciusko area which is planned for December, 1955.

A further point of interest in the life history is that the adult coloration is acquired before metamorphosis. The colours, however, are fugitive in 10% formalin. The only specimen of a newly metamorphosed *P. corroboree* in the author's possession (No. 12 in Table 1) is of a fairly uniform dusky tint to the naked eye. Under the microscope, the black bands on the dorsal surface can be made out, but the formalin has changed the yellow colour to a dark brown. The ventral surface is almost uniformly dark brown. The limbs are pale brown with some traces of darker blotches.

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A special acknowledgement is due to Dr. Chaffer for information regarding breeding habits in the field, and the nature of the terrain in which the frogs are found.

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SOME EXAMPLES OF STREAM-DERANGEMENT IN THE KOSCIUSKO AREA.

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Harold Rutledge, B.Sc., Ph.D.

(Two Text-figures.)

[Read 30th November, 1955.]

Synopsis.

From the Kosciusko area above 6,000 feet there are described three examples of stream-derangement resembling stream capture, two involving tributaries of the Upper Murray, and the third a small tributary of the Upper Snowy. All the valleys concerned are glaciated, and it is thought that the apparent piracy resulted primarily from (*a*) the breaching of inter-valley ridges by valley-glaciers whose new paths were afterward followed by the post-glacial streams, and (*b*) the deposition of recessional moraines across the glacial valleys which produced stream-diversion.

Introduction.

Apart from the evidences of Pleistocene glaciation in which it abounds, the Kosciusko region is of interest for its geomorphology, and particularly for the way in which the development of its landforms has been influenced by the passage of ice.

The drainage-pattern is closely related in part to differential elevation in the late Tertiary Kosciusko epoch (Browne, 1952), and in part to the strike-directions of the belts of folded Ordovician quartzites and schists of which the region is partly composed, and to the gneissic foliation, shear-zones and joint-systems of the granite which is the dominant rock, but there are not wanting signs that drainage was to a minor extent deranged and topographical forms modified in consequence of glaciation.

The glaciation was made possible by the elevation of the region to its present altitude, and the Kosciusko uplift initiated a cycle of river-erosion, which caused rejuvenation of the streams; this erosion continued vigorously through Pleistocene time with local interruptions during glacial maxima, and is still proceeding. Three stages of glaciation, it would seem, were experienced; the marks of the second and third, a valley- and a cirque-glaciation respectively, are the most obvious.

There are indications that the courses of certain minor streams have been modified by the passage of valley-glaciers in such a way as to simulate the phenomena of river-piracy and water-gaps as produced by normal river-erosion. Three examples have come under our notice, all in the Tops country at elevations of more than 6,000 feet, where the activity of valley-glaciers was most vigorous. Two of the diversions have affected members of the Upper Murray system, the third a tributary of the Upper Snowy.

Diversion in the Upper Murray System.

(*a*) The Cootapatamba valley heads in the col or saddle known as Rawson Pass (6,930 ft.), some 500 yards E.S.E. of Mt. Kosciusko, which seems to have functioned as a kind of ice-divide whence valley-glaciers moved respectively north along one of the heads of the Snowy River and south towards the Murray along the Cootapatamba valley. This valley trends almost S.S.W. for about 1,100 yards and then S.W. for 1½ miles. Half a mile down from Rawson Pass in a recess in the right wall of the valley lies the shallow Lake Cootapatamba, which occupies the floor of a cirque belonging to the third glacial stage. It is dammed by, and perched on top of, two moraines, the upper confined mainly to the right or western side of the valley, while the lower stretches right across it. Cootapatamba Creek on the valley-floor flows well to the east of the lake, which drains into it below the lower moraine. This has been breached by the creek and is seen to be resting on schist or phyllite.

The boulder-strewn valley is flatly U-shaped as far down as the lake, but below that is rather V-shaped, with a wide flare and steep gradient. Some 450 yards down

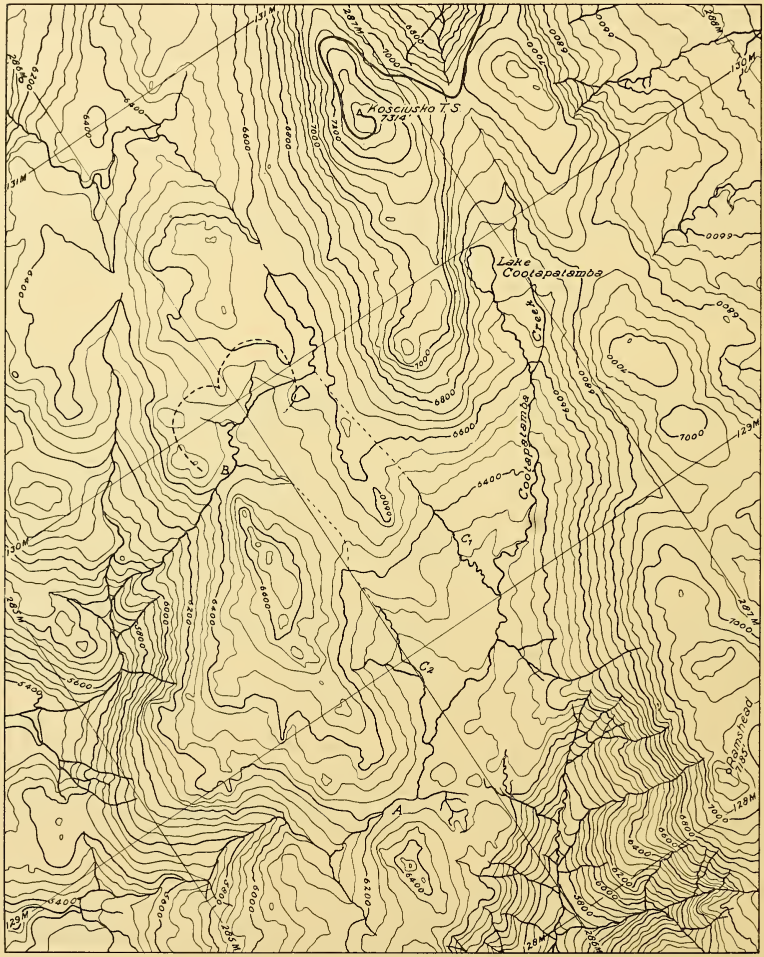

Fig. 1. A map of part of the Upper Murray drainage system. The length of the side of a square on the grid represents one mile. North is towards the top left. The lighter broken lines indicate the suggested original courses of creeks C_1 and C_2.

granite crops out along the floor in the form of three small low platforms, steps, or *roches moutonnées*. About one mile down from Rawson Pass the valley widens out once again and flattens, and the creek, perhaps as the result of increased erosive power following on the white man's occupation, has gouged out a trench 20 feet or more deep to decomposed granite bedrock through coarse débris, probably in part glacial outwash from the Cootapatamba cirque-glacier and in part alluvium deposited by the post-glacial creek. A mile farther down the flat valley floor is heavily aggraded and in places swampy, and the creek is joined on its right bank by two small tributaries flowing from the north in wide but rather steep glacial valleys. The broad valley-floor here gives the impression of a former shallow rock-basin excavated below the junction of the main and tributary glaciers and later filled with detritus, and there is actually a low and inconspicuous southern rock-rim to the basin. A casual glance downstream suggests that the Cootapatamba valley continues on for a long way to the S.W., its eastern wall rising steeply to the Ramshead Range, which carries on southward to the limit of vision. But at 2½ miles from Rawson Pass the broad valley ends abruptly and gives place to the deep gorge of a headwater tributary of Leatherbarrel Creek, itself a tributary of the Indi or Upper Murray, while Cootapatamba Creek bears away to the right, pierces the western wall of its valley in a gap about 300 feet deep and 100 yards wide, and after maintaining its relatively low gradient for a few hundred yards begins to descend somewhat steeply over rapids into a great ellipsoidal bowl-like hollow. This is more than three-quarters of a mile in major diameter, with sides and floor strewn with ground-moraine, and still preserving traces of an original cirque-like character in spite of much dissection by small creeks and gullies. These converge to flow west through a narrow opening to join Geehi Creek, whose waters enter the Upper Murray some 40 miles down from the mouth of Leatherbarrel Creek.

The boulder-strewn floor of the gap in the western wall of the Cootapatamba valley slopes up very gently to the west and gives the impression of a little glaciated valley draining to the east, but Cootapatamba Creek maintains its westward course against this slope to the point where it tumbles down into the large dissected cirque.

Apart from its collinearity there is clear evidence that the tributary gorge of Leatherbarrel Creek is cut in a former continuation of Cootapatamba valley since, though the wall of the gorge descends steeply and evenly from Ramshead Range on the east, a distinct shoulder appears on the west, a remnant of the pre-rejuvenation valley, at about the level (*c.* 6,200 ft.) of the flat Cootapatamba valley, and evidently a former continuation of it.

The Cootapatamba valley is eroded approximately along a narrow belt of phyllite running N.N.E.–S.S.W. and dipping steeply to the east, bounded by hard acid gneissic granite on the west and the hard acid granite of the Ramshead Range on the east. This is the same phyllite belt in which are eroded farther north the collinear valley of an Upper Snowy tributary and the elongated Lake Albina; it narrows to a width of about 400 yards in the Cootapatamba valley and continues south along the left bank of the Leatherbarrel tributary. The collinearity of all the features mentioned is clearly due to glacier- and river-erosion in the belt of relatively soft rock.

The rejuvenated Leatherbarrel tributary is not heading back directly into the floor of Cootapatamba valley but cutting into its eastern bank, possibly along a specially weak band of phyllite; already it appears to have captured a small tributary, and the capture of the main stream is clearly only a matter of time.

To find an explanation for this curious condition of physiographic affairs we must hark back to the time of the second Pleistocene glaciation, when a glacier filled Cootapatamba valley and its continuation in a S.S.W. direction for an unknown but probably considerable distance. From the right a small tributary glacier joined it where the creek now breaks through its western wall, and at the back of this was a large cirque facing west and forming the head of a glacier-filled valley tributary to that of Geehi Creek. Backward ice-erosion of this latter cirque caused it to impinge on and eventually cut into the tributary valley. On the melting of the ice (which was accomplished first in the western cirque) the west-flowing creek captured bit by bit the headwaters of the little tributary till eventually it eroded back to the middle line of the main valley and captured its headwaters. Meanwhile, rejuvenation of Leatherbarrel Creek (consequent on the Kosciusko uplift), which had proceeded steadily during the glaciation, continued thereafter till now it has reached to within a very short distance of where Cootapatamba Creek turns west. An alternative explanation would attribute the apparent capture to overflow through the gap from the glacial rock-basin formed in the floor of the Cootapatamba valley.

It is clear that Leatherbarrel Creek, which at present drops some 4,200 feet in about nine miles to reach the Murray, will continue vigorous headward erosion along the phyllite belt. Cootapatamba valley at the point of capture is still in virtually the same mature condition as when the ice melted, rejuvenation having proceeded at a slow rate against the gneissic foliation of the acid granite. In the process of time it will have recaptured the headwaters of Cootapatamba Creek, which thereafter will be gradually deepened back to the Main Divide at Rawson Pass. The Upper Cootapatamba–Leatherbarrel Creek will thus have become one again as in the days before the valley-glaciation, the water-gap in the western wall will have changed to an air-gap, and the disruption initiated by Pleistocene ice-erosion will have been redressed by rejuvenated river-erosion in the present cycle.

It must be very uncommon for a beheaded stream to recover its lost headwaters, as Leatherbarrel Creek is destined to do, because normally the victim has a lower gradient and a slower rate of erosion than the aggressor, and the handicap is accentuated by the diversion of the headwaters. In the present instance the pirate stream, Geehi Creek, actually had a longer course to the Murray and a lower average gradient, and was eroding against the grain of the granite, whereas Leatherbarrel Creek was carving its valley into softer rocks along their strike. It is therefore most probable that the capture of the Cootapatamba headwaters was the result primarily of ice-action, as suggested above, and not of normal river-erosion. Once the advantage conferred by ice-erosion disappeared Leatherbarrel Creek was rejuvenated much more rapidly than Cootapatamba Creek, and retribution will be fully accomplished when the pirate is beheaded by its erewhile victim.

(*b*) The two small tributaries of Cootapatamba Creek mentioned above which join it on the right bank show signs of derangement in their upper parts. On a shelf or bench fronting Mt. Kosciusko on the west and 700 feet below it a creek rises in a flat, somewhat swampy, moraine-filled col and meanders along a wide shallow valley through a drained bog in a southerly direction for about half a mile; it then turns sharply to the west, flows through a gap *c.* 50 feet high and 50 yards wide, tumbles down rather abruptly through about 100 feet in 50 yards, and flows with a gentle gradient through two intersecting shallow basins each about 300 yards across (indicated by curved broken lines in Fig. 1), breaching the low bounding ridge or spur between them. The more westerly basin, whose floor is 25 or 30 feet below that of the other, is alluviated, and across its silts the creek meanders to pierce its western wall, some 100 to 150 feet high, by a water-gap about 400 yards long and 50 yards wide at the base, thereafter making a rapid descent of more than 1,400 feet and flowing west to join Lower Cootapatamba Creek 1½ miles away. Southwards from the little basins the land rises gradually for about 600 yards through 70 feet to a col, bounded by ridges 150 to 250 feet high, which forms the head of the more westerly (C_2) of the two south-flowing tributaries of Upper Cootapatamba Creek.

Evidences of glaciation abound. The flat col in which the creek rises is moraine-strewn, its eastern wall shows signs of shorn spurs, and the long, narrow bog which it traverses clearly lies in an ice-scooped trough or basin. Beyond the point where the creek turns west the valley itself continues south to a moraine-strewn col hung up above the eastern basin. Morainic boulders pack the gut where the creek passes west, the sides and floor of the eastern basin and the water-gap by which the creek pierces the western wall, and moraine strews the floor of the valley south of the little basins, culminating in the col 600 yards south of the westerly one. Signs of glacial erosion are evident in the numerous shallow cols in the ridges, and in the smoothed faces of granite in the water-gaps and as scattered outcrops within the eastern basin. The silts in the western basin show some banding, though it is uncertain if this is fluvio-glacial.